UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
WATER

MEMORANDUM

TO: Regional Administrators
Regions I – X

FROM: Benjamin H. Grumbles
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SUBJECT: Deepwater Liquefied Natural Gas Terminals and Clean Water Act Technology-Based Limitations and Conditions

This memorandum clarifies policy for EPA Regional Offices regarding the derivation of technology-based effluent limitations in National Pollutant Discharge Elimination System (NPDES) permits for offshore liquefied natural gas (LNG) terminals. This memo emphasizes the importance of considering non-water quality environmental impacts and other appropriate factors, as provided in the Clean Water Act (CWA), including factors unique to the particular LNG port. This emphasis is important to help ensure consistency, certainty, and predictability in meeting the nation's energy needs. I also stress the need for careful evaluation of design elements, pollution prevention practices, and operating methods that are proposed by a particular permit applicant, especially when those elements have the effect of minimizing and, when possible, preventing potential adverse environmental effects on the marine environment.

The policy statements described in this memorandum respond to questions that have arisen regarding how the CWA and implementing regulations should be applied, particularly the regulations related to derivation of technology-based effluent limitations. This memorandum is not intended to change any substantive requirements of the CWA or implementing EPA regulations. Those requirements continue to apply. Instead, my intention is to provide useful information regarding the exercise of discretion under EPA's regulations. Accordingly, the memorandum explains EPA's authority to prescribe effluent limits on the minimum temperature of discharges from deepwater LNG ports and describes application of best professional judgment in the development of effluent limits based on the best available technology economically achievable as part an overall set of permit conditions.

Background

The Deepwater Port Act and other statutes require licenses and permits for construction and operation of LNG facilities. EPA is responsible under Clean Water Act Section 402 for issuance of NPDES permits for proposed discharges from offshore LNG terminals, including discharges associated with re-gasification systems. EPA is responsible for all NPDES permitting outside the three-mile territorial seas, even offshore from states authorized to administer the NPDES program.

LNG is natural gas that becomes liquid after being supercooled to approximately minus 260 degrees Fahrenheit. The process of liquefaction reduces the volume of gas by nearly 600 times, making it possible to economically transport the gas by ship to onshore and offshore terminals where re-gasification technology converts it back to a gaseous state for distribution to consumers. "Vaporizers" are used at the import terminals to heat the LNG by piping the LNG through a warming water bath. As that warming water cools through heat exchange with the vaporizing LNG, it is either re-warmed in a "closed cycle" or replaced in an "open cycle" (if the available source water is sufficiently warm to vaporize LNG). The primary closed cycle re-gasification technology that has been used or proposed is known as submerged combustion vaporization (SCV). The open cycle technologies include open rack vaporization (ORV) and intermediate fluid vaporization (IFV), or "shell-and-tube."

SCV systems burn a portion of the re-gasified natural gas product to re-heat warming water. SCV is a "zero discharge" option for process water, except periodic maintenance-related discharges when some of the water is exchanged to maintain proper pH levels. LNG import facilities at on-shore coastal locations use (and some of the deepwater location proposals have proposed to use) SCV re-gasification.

ORV uses surrounding seawater at ambient temperature to heat and re-gasify the LNG. As such, its use is limited to locations where ambient water temperatures are sufficiently warm to do so. This technology involves pumping in new sea water, adding an anti-fouling agent (for example, sodium hypochlorite), relying on the heat contained in seawater for warming the LNG, and releasing the water at lower temperatures back to the sea. In an ORV system, seawater is cooled as a result of heat transfer and released back to the environment an average 13 – 22 degrees Fahrenheit lower than the ambient seawater temperature at intake depth. The proposed ORV re-gasification systems would use an approximate annual average of over 100 million gallons per day or more of seawater to vaporize the LNG.

IFV systems can operate in open or closed cycles depending on the availability of source water of a sufficiently warm temperature. Proposals for deepwater locations where re-gasification would occur aboard vessels, which may operate in either warm or cold waters, rely on IFV re-gasification technology.

Regulatory Framework

Under the CWA, NPDES permits must incorporate effluent limitations for toxic and non-conventional pollutants that represent application of the "best available technology economically achievable." See CWA Section 301(b)(2)(A). CWA Section 304(b) authorizes EPA to establish effluent limitation guidelines (ELGs) reflecting the degree of effluent reduction attainable according to the CWA's various technology-based standards, for example, BAT, for classes or categories of point sources. For classes or categories of point sources for which EPA has developed an ELG, permitting authorities apply that ELG to establish technology-based limits in NPDES permits for discharges in the relevant class or category. EPA has not established an ELG for LNG import terminals.

Where EPA has not established an applicable ELG, CWA Section 402(a) and implementing regulations at 40 CFR 125.3(c)(2) provide that the technology-based effluent limits in an NPDES permit will be established on a case-by-case basis by the permit writer. These case-by-case limits apply both to existing dischargers and to new dischargers. In deriving these limits, also referred to as "best professional judgment" (BPJ) limits, the permit writer needs to consider: (1) The appropriate technology for the category or class of point sources of which the permit applicant is a member, based on all available information, and (2) any unique factors relating to the applicant. 40 C.F.R. 125.3(c)(2). The technologies upon which EPA relied in establishing the ELG applicable to offshore oil and gas production appear to be appropriate for some of the discharges associated with offshore LNG ports, but do not addresss re-gasification-related discharges.

CWA Section 304(b)(2)(B) directs EPA to take certain factors into account in assessing BAT for a national categorical ELG, specifically:

1. Age of equipment and facilities involved;
2. Process employed;
3. Engineering aspects of the application of various types of control techniques;
4. Process changes;
5. Cost of achieving effluent reduction;
6. Non-water quality environmental impact (including energy requirements), and
7. Such other factors as the Administrator deems appropriate.

EPA's regulations require the same factors to be considered by permit writers in setting case-specific limitations. 40 C.F.R. 125.3(d)(3) & (c)(2)(ii). For case-by-case permitting, EPA's regulations require a permit writer to consider "unique factors relating to the applicant."

Effluent Limits on the Minimum Temperature of Re-gasification-related Discharges from Offshore LNG Ports Using ORV

Under the CWA, "the discharge of pollutants" is prohibited except in compliance with the CWA, including Section 402. Discharges from an offshore LNG port are subject to NPDES permits. Such permits must contain "effluent limitations" based on the standards specified under the CWA. A discharge from an offshore LNG port, including any re-gasification-related discharge from a port using an ORV system, constitutes the discharge of a pollutant because the CWA defines pollutants to include "industrial waste." As such, the NPDES permit must contain effluent limitations for that industrial waste. The CWA defines "effluent limitation" to mean "any restriction on rates, quantities, or concentrations of chemical, physical, biological, or other constituents which are discharged." The thermal energy of a discharge, i.e., as measured in British Thermal Units (BTUs), is a physical constituent of the discharge, and, as such, may appropriately be addressed by an effluent limitation.

Application of BAT Factors in the Development of Effluent Limits on a BPJ Basis for Individual Offshore LNG Ports

The CWA does not directly address the precise question of whether and under what circumstances any particular technology represents the BAT upon which effluent limits should be based. The seven BAT factors listed in CWA section 304(b)(2) inform EPA's decision, in the context of a particular ELG rulemaking or a case-by-case BPJ permit, regarding what technology is the "best available technology economically achievable." EPA has broad discretion in weighing those factors. *NRDC v. EPA*, 863 F.2d 1420, 1426 (9th Cir. 1988). Decision-making regarding when and under what circumstances a particular technology represents the "best" technology has historically been a matter of considered and reasoned judgment confirmed by the Administrator through ELG rulemaking. In the context of NPDES permits, however, the authority to identify the "best" technology upon which BPJ limits are based has been delegated to the Regional Administrators. This memorandum provides policy input to help inform that decision-making.

Although technical and economic data and information are necessary to inform BPJ decision-making, especially when applying the first five BAT factors, information pertaining to the sixth BAT factor ("non-water quality environmental impact") is particularly important for offshore LNG port permitting. Also of great importance is consideration of "unique factors relating to the applicant." These two decision-making criteria inform EPA's discretion to determine which technology – from among a list of available and economically achievable technologies – is actually the "best" technology in any particular case and should be given particular emphasis in the determination of BAT.

1. Non-Water Quality Environmental Impact (including Energy Requirements)

Closed cycle SCV technology relies on combustion of natural gas associated with LNG warming/re-gasification; ORV systems do not. Consequently, re-gasification by SCV typically generates about four times the NOx emissions and 2.5 times the SOx emissions when compared with ORV systems. In addition, SCV systems also use more energy than ORV systems. Re-gasification by SCV systems could impose between a 1% - 2% energy requirement on any particular offshore LNG port that would not be imposed using open loop systems, particularly in the Gulf of Mexico where both ORV and SCV systems are available technologies.

As you consider technology options, such as SCV re-gasification, as candidates for BAT, I remind you that non-water quality environmental impacts can be the deciding factor in accepting or rejecting a technology as BAT. When EPA promulgated the ELGs for offshore oil and gas operations, EPA rejected a "zero discharge" technology even after concluding that it was technologically available and economically achievable, because the Agency judged the non-water quality environmental impacts to be unacceptably high. EPA concluded that, under those circumstances, the zero discharge technology was not the "best" technology under consideration. The Sixth Circuit upheld not only EPA's reliance on non-water quality environmental impacts as the critical decision factor, but also EPA's broad discretion to weigh the relative impact of different environmental harms. *BP Exploration & Oil Company, Inc., v. EPA*, 66 F.3d 784, 800-02 (6th Cir. 1995). The court concluded that EPA did not abuse its discretion when the Agency decided, in the context of California facilities, to prioritize consideration of the increased air emissions produced by that technology over the water pollution advantages associated with the zero discharge technology. *Id.* at 802. Nor was the court troubled by the fact that the estimated increment of air emissions was small compared to overall air pollution in California. *Id.* at 801.

In addition to directing EPA to consider non-water quality environment impacts, (such as air emissions) when making a BAT determination, this statutory factor also directs the Agency -- or the permit writer, in a BPJ context -- to consider the "energy requirements" associated with the candidate BAT technologies. Particular emphasis should be given to the consideration of energy requirements associated with re-gasification technologies when you are determining what is the "best" available technology economically achievable in any particular case. When several re-gasification technologies are "available" in a particular context, e.g., in Gulf waters, the "energy requirements" component of this statutory factor can be useful in distinguishing among those systems. Doing so would be consistent with the purposes of the Deepwater Port Act. In that statute, Congress declared a purpose to "promote ... natural gas production on the outer continental shelf by affording an economic and safe means of transportation of outer continental shelf ... natural gas to the United States mainland." 33 U.S.C. § 1501(a)(6). The greater energy requirements associated with SCV systems also may be relevant to your BPJ economic achievability analysis, i.e., the fifth BAT factor, because this energy requirement will raise costs (i.e., result in foregone revenues) and reduce the energy available to meet the Nation's energy needs.

2. Unique Factors Relating to Particular Applicants in the Gulf of Mexico:

EPA's regulations require the permit writer to consider "[a]ny unique factors relating to the applicant" when determining BAT for that facility. 40 C.F.R. 125.3(c)(2)(ii). This means that any design elements, pollution prevention measures, or process changes planned or installed by a particular offshore LNG port that result in greater loading reductions must be taken into account in the permit writer's BAT analysis; when these measures and practices reduce the discharge of pollutants, the permit writer can – and, indeed, should – consider them to be part of the suite of technologies ultimately determined to be BAT. *See* CWA 304(b)(2)(A). In the context of an offshore LNG port, for example, an operator might propose an ORV re-gasification system enhanced by pollution minimization measures (e.g., intake practices that reduce the discharge of solids, such as variable depth water intakes, diffusers, specialized intake screens, reduced intake velocities). These types of "process and procedure innovations" and "operating methods" fall within the ambit of section 304(b)(2)(A), and therefore are a lawful basis for BAT limitations. The same is true for measures, practices or treatment techniques that an operator identifies for the purpose of reducing chlorine discharges or addressing temperature changes or chlorine discharges. Where supported by the record, you may reasonably conclude that ORV, enhanced by those practices, measures, and treatment techniques, would represent the "best" available technology with respect to a particular port.

Early Identification of LNG License or Permit Conditions

In order to expedite the environmental review of applications associated with offshore LNG ports and to facilitate the development of appropriate design measures and/or operating conditions, you should work with DPA applicants, involved agencies, and other stakeholders as early in the process as possible. Early engagement is consistent with the "*Memorandum of Understanding Related to the Licensing of Deepwater Ports*, dated March 19, 2004, executed among various federal agencies, including EPA, as well as E.O. 13212 ("Actions to Expedite Energy-Related Projects"). EPA engagement both before and after applications for the necessary permits are filed, but at a minimum prior to final action on the DPA license, should help to build consensus among governmental agencies to identify and resolve issues associated with offshore LNG ports, including potential adverse environmental impacts affecting air quality, water quality, or other aspects of the marine environment and the measures to address them. I strongly encourage you to make an early identification of design elements, pollution prevention measures and/or operating conditions that not only reduce pollutant discharges but also minimize or, if possible, eliminate adverse impacts on the marine environment generally. DPA applications (or modifications thereto), in turn, should reflect such measures and conditions. Among other things, EPA should also offer its expertise to assist the DPA licensing agencies in the design of any monitoring protocols when appropriate to evaluate the extent of modeled impacts.

To date, for example, DPA applicants (and other federal agencies) have undertaken significant work to develop measures for reducing pollutant discharges and minimizing potential adverse environmental effects associated with the operation of ORV re-gasification systems. Such measures include both design features and operational controls: specialized intake screens that reduce entrainment of icthyoplankton; variable depth intake technology to allow water intakes to be located at optimal water depths to minimize entrainment; restrictions on intake velocities to ensure these velocities are below local currents speeds; diffusers to reduce scour and encourage temperature rebound in discharge waters to minimize potential "cold shock" to juvenile fish and larvae; and neutralization of chorine residual in the discharge. Early participation by EPA should result in DPA licenses that incorporate any such necessary measures and conditions. Accordingly, the Deepwater Port Act license itself (issued with conditions imposed to reflect the MARAD record of decision) would provide EPA with the basis to rely upon implementation of the DPA-required pollution prevention measures and conditions when the Agency evaluates appropriate NPDES permit conditions, including the technology or technologies that represent the "best" available technology economically achievable on a BPJ basis.

Situations may arise when EPA (or an applicant) has identified pollution control measures and/or operating practices that reduce pollutant discharges and minimize or, where possible, avoid adverse environmental impacts, but the DPA record of decision ultimately issued does not clearly require the licensee to implement those measures or conditions. In those cases, you should not only incorporate those technologies and pollution prevention-based measures and practices into your BAT analysis (and, when appropriate, include them as part of the technology suite you determine to be that facility's BAT), but you should also include necessary measures and/or practices in the NPDES permit as enforceable conditions. Except under extraordinary circumstances, however, the NPDES permit should not be used to add additional conditions that EPA (or the applicant or other federal agencies) could have foreseen but had not identified previously. Your authority to impose these measures and practices as permit conditions derives from 40 C.F.R. 122.44(k), which authorizes permit conditions that "control or abate the discharge of pollutants when: ... (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA." Included within the scope of this regulation are permit conditions designed to memorialize, as enforceable requirements, the information about waste streams and processes that are disclosed by the facility in its NPDES permit application. EPA's regulations at 40 C.F.R. 122.43(a) also provide a legal basis for these permit conditions, if the record shows that the permitted discharge would meet CWA requirements only if the facility implements the pollution minimization measures and operating conditions at issue.

Finally, to the extent a DPA applicant proposes specific adaptive management measures (e.g., aquaculture projects to stock species of fish potentially affected by the terminal operation, wetlands restoration to support fish spawning habitat, artificial reef construction, and similar actions to minimize potential fisheries effects associated with LNG terminal operations), those measures should be included in the DPA license. If the

DPA license is unclear regarding the adaptive management measures, and implementation of those measures would be necessary in order to assure compliance with the CWA's ocean discharge criteria, you could rely on the same regulatory authorities identified in the preceding paragraph to justify incorporating the measures as NPDES permit conditions. In this latter situation, the permit record should specifically demonstrate how these measures are reasonably necessary to achieve effluent limitations or to carry out the purposes of the CWA, for example, "to restore and maintain the ... biological integrity of the Nation's waters."

Conclusion

You are undoubtedly aware of the importance of an administrative record to document and demonstrate the bases, including not only data and information, but also the reasoning and rationale, for an agency's action. The need for a robust administrative record is no less critical for NPDES permitting, including offshore LNG ports. This memorandum discusses the statutory factors that apply in assessing BAT on a BPJ basis for offshore LNG ports, focusing on terminals proposed in the warmer waters of the Gulf of Mexico where both SCV and ORV re-gasification technologies are available. Key considerations for assessing BAT for LNG facilities in the Gulf of Mexico are "non-water quality environmental impacts" and factors unique to the particular offshore LNG port. The relevant non-water quality environmental factors include consideration of air emissions and energy requirements. This memorandum emphasizes consideration of the purposes of the Deepwater Port Act to ensure consistency, certainty, and predictability in meeting the nation's energy needs, and careful evaluation of design elements, pollution prevention measures, and operating methods proposed by a particular permit applicant that reduce pollutant discharges and that promote EPA's goal of minimizing and, where possible, avoiding potential adverse environmental impacts associated with offshore LNG ports.